

# **ZERO EMISSION BUS REGULATION**



Gerhard Ahtelik  
California Air Resources Board

Public Workshop – Diamond Bar  
June 21, 2006

# Today's Presentation

---

- ◆ Urban Transit Bus Regulation / Zero Emission Bus (ZBus) Regulation
- ◆ April 14 Proposal
- ◆ Comments
- ◆ June 21 Proposal

# Zero Emission Bus Regulation

## ◆ ZBus purchase requirements

### ◆ Diesel path

- ◆ Based on number of buses January 1, 2007
- ◆ Agencies with > 200 buses
- ◆ 15% 2008-2015

### ◆ Alternative-Fuel path

- ◆ Based on number of buses January 1, 2009
- ◆ Agencies with > 200 buses
- ◆ 15% 2010-2015

# Affected Transit Agencies

<b>Transit Agency</b>	<b>Fuel Path</b>	<b>January 1, 2005</b>	<b>15 %</b>
Long Beach Transit	D	191	29
Golden Gate Transit	D	221	33
San Mateo County Transit District	D	347	52
Santa Clara Valley Transportation Authority	D	531	80
Alameda/Contra Costa Transit	D	672	101
San Francisco Municipal Railway	D	893	134
North County Transit District	A	155	23
Santa Monica Big Blue Bus	A	174	26
Omnitrans	A	176	26
Sacramento Regional Transit District	A	253	38
Foothill Transit	A	306	46
San Diego Metropolitan Transit System	A	451	68
Orange County Transportation Authority	A	612	92
Los Angeles County MTA	A	2563	384



# ZBus Challenges

---

- ◆ Cost
- ◆ Reliability
- ◆ Availability
- ◆ Fuel cell service life
- ◆ Fueling infrastructure

# **ZBus Regulation**

## **Modifications Under Consideration**

- ◆ Initiate purchase requirement through Advanced Demonstration
- ◆ Advanced Demonstration benefits
  - ◆ Allows transit agencies to phase in ZBuses
  - ◆ ZBuses count towards purchase requirements
- ◆ 15 Percent purchase requirement
  - ◆ Postponed
- ◆ Executive Officer Discretion Clause
  - ◆ Allows technology development to continue
  - ◆ Sets firm targets for manufacturers
  - ◆ Provides transit agencies with performance assurances

# **April 14, 2006 - Proposal**

---

- ◆ Advanced Demonstration
  - ◆ Single TA
  - ◆ Multi TAs
  - ◆ Both fuel paths
- ◆ Purchase Requirement
  - ◆ Postponed 2 years

# **Advanced ZBus Demonstration**

## **April 14, 2006 - Proposal**

	Diesel	Alt.-Fuel
Solicit Bid Proposals	July 2007	July 2009
Start ZBus Operation	January 2009	January 2011
Infrastructure	Required by Jan 2010	Required by Jan 2012
Purchase Requirement	January 2010	January 2012



# Demonstration Options

## April 14, 2006 - Proposal

	Diesel Path and Alternative Path	
Number of Transit Agencies (TA)	Single	Multiple
Zero Emission Buses	10	3 per TA Min 12
Maintenance & Operation Training	All Participating Transit Agencies	

# Comments

## Metropolitan Transportation Authority

---

### Alternative Fuel Path Transit Agencies

- ◆ Postpone purchase requirement to at least 2012
- ◆ Advanced Demonstration Diesel Path only

# Comments

## Metropolitan Transportation Commission

### Diesel Path Transit Agencies

- ◆ Accelerated testing necessary
  - ◆ 2007-2009
- ◆ Demonstration 2009-2012
  - ◆ 7 buses total for 5 agencies
  - ◆ Additional buses if funding granted (up to 17 total)
- ◆ Purchase requirement
  - ◆ 2014 for Diesel path

# Fuel Cell Mfr. Comments

	Purchase Requirement	
	Diesel Path	Alternative Fuel Path
<b>United Technologies Corporation</b>	Keep Current Regulation	
<b>Ballard</b>	Keep Current Regulation	



# **Revised Staff Proposal**

## **June 21, 2006**

---

- ◆ Advanced Demonstration Modifications
  - ◆ Alternative Fuel Path Modification and Options
- ◆ Purchase Requirement Modifications
  - ◆ Technology review
  - ◆ Executive Officer discretion
  - ◆ Extend purchase requirement

# Demonstration Options

## June 21, 2006 - Proposal

	Diesel Path		Alt. Fuel	
Number of Transit Agencies (TA)	1	Multiple	1	Multiple
Zero emission buses*	6	Min 3/TA Min 12	6	Min 3/TA Min 12
Start Bus Operation	Jan 2009		Jan 2010	
Maintenance & Operation Training	All Participating Transit Agencies			

\*Additional options for Alt. Fuel Path on next slides

# **Advanced ZBus Demonstration**

## **June 21, 2006 - Proposal**

	Diesel	Alternative Fuel	
Demonstration	Required	No	Yes
Solicit Bid Proposals	July 2007	N/A	July 2008
Zero Emission Buses in Operation	Jan 2009	N/A	Jan 2010
Purchase Requirement	Jan 2011	Jan 2011	Jan 2012

# **Near Zero / Non-Urban Buses**

## **June 21, 2006 Proposal**

- ◆ Near Zero or Non-Urban buses may be considered under Executive Officer discretion
  - ◆ Hybrid hydrogen fueled ICE Urban Bus
  - ◆ Non-Urban, battery dominant, fuel cell bus
  - ◆ Battery only bus
- ◆ Develop ZBus through bridging Technologies
- ◆ Emission reductions benefit
- ◆ Early implementation credits reduced



# **Near Zero / Non-Urban Buses**

## **June 21, 2006 Proposal**

- ◆ The following characteristics need to be addressed and discussed
  - ◆ Passenger capacity
  - ◆ Operating characteristics (hours of operation, refueling)
  - ◆ Performance (freeway, grades)
  - ◆ Chassis durability and warranty
  - ◆ Emissions
  - ◆ Other

# Options for Alternative Fuel Path

## June 21, 2006 - Proposal

---

### ◆ Option 1

- ◆ Demo = All Zero Emission Buses

### ◆ Option 2

- ◆ No demo
- ◆ Purchase requirements lines up with Diesel Path

### ◆ Option 3

- ◆ Demo may include EO approved Near Zero (NZ) or Non Urban (NU) buses
- ◆ NZ + NU Buses = 1/2 of demo (maximum)
- ◆ NZ or NU buses count as 1/3 of a ZBus
- ◆ NZ & NU buses do not count towards purchase requirement

# EO Discretion

---

- ◆ Purchase requirement postponed if cost, durability, and reliability goals are not met
- ◆ Analysis determined 18 months prior to Purchase Requirement Date
- ◆ If goals are not met
  - ◆ Sliding percentage for purchase requirement
  - ◆ Postpone purchase requirement by one year
  - ◆ Re-evaluate annually

# Example Scale for Executive Officer

Purchase Requirement	15%	10%	5%	2%
Fuel Cell Bus Cost compared to electric trolley	1 : 1	1.25 : 1	1.5 : 1	1.75 : 1
Durability or Warranty*	20,000	15,000	10,000	5,000
Reliability**	10,000	7,500	5,000	2,000

\* Fuel cell life in hours

\*\* miles between service calls—propulsion system related



# Statewide ZBus Workgroup

---

- ◆ Form state wide fuel cell bus working group
  - ◆ Coordinate and leverage statewide effort
  - ◆ Share technology learnings
  - ◆ Discuss resource options
  - ◆ Set First Meeting

# Next Steps

---

- ◆ Collect additional input from transit agencies
- ◆ August release of staff report
- ◆ September 2006 Board hearing

# Contact Information

---

Gerhard Achtelik at:  
gachteli@arb.ca.gov  
(916) 323-8973  
or

Lesley Crowell at:  
lcrowell@arb.ca.gov  
(916) 323-2913